

Abstract Submitted  
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**Optical coupling to spin waves in the cycloidal multiferroic  $\text{BiFeO}_3$** <sup>1</sup> ROGERIO DE SOUSA<sup>2</sup>, Department of Physics, University of California, Berkeley, CA, USA, JOEL E. MOORE, Department of Physics, University of California, and Material Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA, USA — The magnon and optical phonon spectrum of an incommensurate multiferroic such as  $\text{BiFeO}_3$  is considered in the framework of a phenomenological Landau theory. The resulting spin wave spectrum is quite distinct from commensurate substances due to soft mode anisotropy and magnon zone folding. The former allows electrical control of spin wave propagation via reorientation of the spontaneous ferroelectric moment. The latter gives rise to multiple magnetodielectric resonances due to the coupling of optical phonons at zero wavevector to magnons at integer multiples of the cycloid wavevector. These results show that the optical response of a multiferroic reveals much more about its magnetic excitations than previously anticipated on the basis of simpler models.

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